

What is claimed is:

1. A cross-connector assembly for interconnecting a pair of orthopedic rods, said assembly comprising:

5 an interconnection element including a first body having a first aperture formed therein and a stud extending from the body;

a first rod connector including a first shaft terminating in a first rod engaging portion and a projection extending laterally from said first shaft and displaced axially along said first shaft from the spinal rod engaging portion, said 10 first shaft and said projection slideably received within the first aperture;

a second rod connector including a second shaft having a second body carried thereon, said second body having a second aperture formed therein, said second aperture having the stud received therein; and

a fastener configured to engage with the stud.

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2. The assembly of claim 1 wherein the first aperture defines a first axis extending through the first body and the stud is positioned to lie substantially orthogonal to the axis.

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3. The assembly of claim 1 wherein the first aperture is non-circular.

4. The assembly of claim 1 wherein the first shaft exhibits a substantially round cross-sectional profile.

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5. The assembly of claim 1 wherein the first rod connecting portion comprises a curved member configured to at least partially encircle a spinal rod.

6. The assembly of claim 5 wherein the first rod connecting portion comprises a threaded aperture extending into the curved member.

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7. The assembly of claim 1 wherein the first shaft is substantially straight.
8. The assembly of claim 1 wherein the first shaft is curved.
- 5 9. The assembly of claim 8 wherein the second shaft is curved.
10. The assembly of claim 1 wherein the first shaft is slidable received within the first aperture to allow the first rod engaging portion to be spaced from the second rod engaging portion at varying distances.
11. The assembly of claim 10 wherein the second shaft is rotatable about an axis defined by the stud to vary an angle defined by the first shaft and the second shaft.
- 15 12. The assembly of claim 11 wherein the first shaft and the second shaft are curved.
13. The assembly of claim 11 comprising a washer carried by the stud and positioned between the stud and the second aperture of the second rod connecting member.
- 20 25 14. The assembly of claim 13 wherein the second aperture of the second shaft is configured to allow the second shaft to pivot along the axis defined by the stud.
15. The assembly of claim 14 wherein the first rod connector is rotatable about an axis defined by the first shaft.

16. The assembly of claim 1 wherein the second body on the second shaft includes a lower surface, wherein engagement of the fastener to the stud urges the lower surface to contact the first shaft and clamp the first shaft in a first orientation relative to the second shaft.

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17. The assembly of claim 1 wherein the first rod connector is rotatable about an axis defined by the first shaft.

18. The assembly of claim 17 wherein rotation of the first rod connector induces the projection to contact said first body and inhibits removal of the first shaft from the first aperture.

19. The assembly of claim 17 wherein the first rod connector is rotatable about an axis defined by the stud.

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20. The assembly of claim 19 wherein the second rod connector is rotatable about an axis defined by the stud.

21. The assembly of claim 20 wherein the first shaft of the first rod connector and the second shaft of the second rod connector are curved.

22. The assembly of claim 21 wherein the first shaft is slidable received within the first aperture to allow the first rod engaging portion to be spaced from the second rod engaging portion at varying distances.

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23. The assembly of claim 22 comprising a first spinal rod secured to the first rod engaging portion and a second spinal rod secured to the second rod engaging portion, wherein the first spinal rod is positioned to lie non-parallel to the second spinal rod.

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24. The assembly of claim 1 comprising a washer carried by the stud and positioned in the second body of the second rod connecting member, wherein engagement of the fastener to the stud urges the washer to contact the first shaft of the first rod connecting member and clamp the first rod connecting member in a 5 first orientation relative to the second rod connecting member.

25. The assembly of claim 24 wherein the washer is composed of a deformable material.

10 26. The assembly of claim 25 wherein engagement of the fastener to the stud induces the washer to deform.

27. The assembly of claim 24 wherein engagement of the fastener frictionally engages the washer to the first shaft of the first rod connector.

15 28. The assembly of claim 24 wherein engagement of the fastener to the stud secures the second rod connector in a selected orientation.

29. The assembly of claim 1 comprising a first spinal rod secured to the 20 first rod engaging portion and a second spinal rod secured to the second rod engaging portion, wherein the first spinal rod is positioned to lie non-parallel to the second spinal rod.

30. The assembly of claim 29 wherein the first spinal rod defines a first 25 plane and the second spinal rod is positioned to lie in a plane different from the first plane.

31. The assembly of claim 1 wherein the first rod engaging portion 30 comprises a hook sized to at least partially encircle a spinal rod, said hook extending laterally from the first shaft in a first direction and wherein said projection extends laterally from the first shaft along said first direction.

32. The assembly of claim 1 wherein the projection defines a finger, lobe, or ridge.

5 33. The assembly of claim 1 wherein at least one of the first shaft or the second shaft has a smooth exterior surface and a round or oval cross-sectional profile.

10 34. The assembly of claim 1 wherein the first and second shafts are configured to nest with each other.

35. The assembly of claim 1 comprising an insert configured to at least partially encircle said first shaft, said insert disposed within said first aperture.

15 36. The assembly of claim 35 wherein the insert in combination with the first aperture define a ball and socket joint.

20 37. The assembly of claim 1 comprising a washer carried on said first body said washer having a surface including a first set of splines formed therein and wherein the second body on the second spinal rod connector includes a lower surface having a second set of splines formed thereon configured to matingly engage with the first set of splines.

25 38. The assembly of claim 37 wherein the washer includes a lower surface having one or more recesses formed therein provided to contact said first shaft when the first shaft is received within the first aperture.

39. The assembly of claim 1 comprising an insert disposed within the second aperture, said insert configured to at least partially encircle said stud.

40. The assembly of claim 39 wherein the insert in combination with the second aperture define a ball and socket joint.

41. The assembly of claim 39 wherein the insert is substantially  
5 spherical.

42. The assembly of claim 39 wherein the insert is substantially cylindrical.

10 43. A method of treating a spinal defect, said method comprising:  
securing a first spinal rod and a second spinal rod each to two or more vertebrae; and  
interconnecting the first spinal rod to the second spinal rod using the assembly of claim 1.

44. A cross-connector assembly for interconnecting a pair of orthopedic rods, said assembly comprising:

- a first rod connector including a first shaft terminating in a first body having a channel therethrough;
- 5 a second rod connector including a second shaft defining a longitudinal axis and terminating on a first end with a rod engaging portion and on an opposite second end with a second body, said second body having a first aperture therein defining a first central axis positioned to lie in a plane with the longitudinal axis, said second rod connector also including a second aperture therein defining a 10 second central axis positioned to lie at an angle to the first central axis;
- 15 an insert configured to engage the first shaft of the first rod connecting member extending through the first aperture and positioned in said second body and in communication with said second aperture; and
- a fastener extending through the second aperture of the second body and engaging one or more of the insert, the second body of the second rod connector, or the first shaft of the first rod to secure the orientation of the first rod connector relative to the second rod connector.

45. The cross connector assembly of claim 44 wherein the first shaft of 20 the first connector is straight.

46. The cross connector assembly of claim 44 wherein the first shaft of the first connector is curved.

25 47. The cross connector assembly of claim 44 wherein the first aperture and the second aperture intersect.

48. The cross connector assembly of claim 44 wherein the fastener engages with both the insert and the first shaft.

49. The cross connector assembly of claim 44 wherein the fastener engages the insert thereby securing the first rod connecting member in a desired orientation relative to the second rod connecting member.

5 50. The cross connecting assembly of claim 44 wherein the fastener engages the first shaft thereby securing the first rod connecting member in a desired orientation relative to the second rod connecting member.

10 51. The cross connecting assembly of claim 44 wherein the fastener engages the second body of the second rod connector thereby securing the first rod connecting member in a desired orientation relative to the second rod connecting member.

15 52. A method of treating a spinal defect, said method comprising:  
securing a first spinal rod and a second spinal rod each to two or more vertebrae; and

interconnecting the first spinal rod to the second spinal rod using the assembly of claim 44.

20 53. An cross connector comprising  
an interconnection element including a first body having an aperture formed therein and a stud extending from said body;  
a first spinal rod connector including a first shaft having a proximal end received within said aperture and a distal end carrying a first spinal rod engaging portion configured to at least partially encircle a spinal rod;

a second spinal rod connector having a second body on a proximal end, a second spinal rod engaging portion on a distal end and a second shaft extending therebetween, wherein said body includes a second aperture having the stud received therein; and

30 a single fastener to secure the first and second spinal rod connectors to each other at a user defined orientation relative to each other.

54. The apparatus of claim 53 comprising an insert positioned with the first body and configured to at least partially encircle the first shaft.

5 55. The apparatus of claim 53 wherein the insert in combination with the first body restricts movement of the first shaft to inhibit disassembly of the apparatus.

10 56. The apparatus of claim 53 wherein the first shaft comprises a protuberance extending laterally therefrom, said protuberance sized to be received within said first aperture.

57. The apparatus of claim 53 comprising an insert positioned within the second body and configured to at least partially encircle the second shaft.

15 58. A method of treating a spinal defect, said method comprising:  
securing a first spinal rod and a second spinal rod each to two or more vertebrae; and  
interconnecting the first spinal rod to the second spinal rod using the  
20 assembly of claim 53.